CLAIMS

1. – 13. (Cancelled)

14. (Currently Amended) An implantable medical device (IMD) for delivery therapy for sleep-disordered breathing comprising:

means for determining the presence of sleep-disordered breathing; ~~and~~

means for delivering augmentation therapy when the means for determining indicates the presence of sleep-disordered breathing;

means for providing atrial pacing in combination with the augmentation therapy; and

means for calculating a mean heart rate, wherein the means for providing atrial pacing pace the atria at an atrial rate that is a multiple of a desired ventricular rate and the desired ventricular rate is determined based the mean heart rate.

15. (Original) The IMD of claim 14, further comprising:

means for identifying the onset of an episode of sleep-disordered breathing; and

means for causing the means for delivering to deliver the augmentation therapy prior to the onset of the episode.

16. (Cancelled)

17. (Currently Amended) The IMD of claim ~~16~~14, further comprising:

means for calculating a mean heart rate, wherein the means for providing atrial pacing pace the atria at an atrial rate equal to the mean heart rate plus a predetermined value to achieve atrial overdrive pacing.

18. (Cancelled)

19. (Currently Amended) The IMD of claim ~~18~~14, wherein the multiple is two (2).

20. (Currently Amended) The IMD of claim ~~18~~14, wherein the desired ventricular rate is the mean heart rate.

21. (Currently Amended) The IMD of claim ~~18~~14, wherein the desired ventricular rate is the mean heart rate plus an integer value, the integer value defining an atrial overdrive pacing offset.

22. (Original) The IMD of claim 21, wherein the augmentation therapy includes post-extra systolic potentiation having a ventricular rate reducing effect so that the desired ventricular rate is effectuated when the means for providing atrial pacing pace the atria at the atrial rate.

23. (Original) The IMD of claim 14, further comprising:

means for determining a cycle length of a sleep-disordered breathing episode, wherein the means for delivering augmentation therapy deliver the therapy for a period of time based on the determined cycle length.

24. (Original) The IMD of claim 14, further comprising:

means for determining a cycle length of a sleep-disordered breathing episode, wherein the means for delivering augmentation therapy deliver the therapy at a time prior to an onset of sleep-disordered breathing wherein the time is determined by the measured cycle length.

25. (Original) The IMD of claim 14, further comprising:

means for monitoring a heart rate and determining if the heart rate increases over a threshold value;

means for determining an average sleep disorder heart rate based on the heart rates from the means for monitoring; and

means for causing an effective ventricular rate that is greater than the average sleep disorder heart rate when augmentation therapy is delivered.

26. (Original) The IMD of claim 14, wherein the augmentation therapy is non-excitatory stimulation cardiac contractility modulation (NES/CCM).

27. (Original) The IMD of claim 26, wherein the augmentation therapy is delivered along with atrial overdrive pacing (AOP).

28. (Original) The IMD of claim 14, wherein the augmentation therapy is post-extra systolic potentiation (PESP).

29. (Original) The IMD of claim 28, wherein the augmentation therapy is delivered along with atrial coordinated pacing (ACP).

30. (Original) The IMD of claim 29, wherein the ACP includes an AOP component.

31. (Original) The IMD of claim 14, wherein the augmentation therapy includes NES/CCM and PESP.

32. (Original) The IMD of claim 31, wherein the augmentation therapy is delivered along with ACP.

33. (Original) The IMD of claim 32, wherein the ACP includes an AOP component.

34. (Original) The IMD of claim 14, further comprising means for sensing a physical parameter indicative of the onset of sleep-disordered breathing.

35. (Original) The IMD of claim 34, wherein the physical parameter is chosen from the following group: respiration rate, minute ventilation, heart rate, neural activity, apnea, hypopnea, hyperventilation, breath sounds, temperature, blood pressure, chest movement, impedance, saturated carbon dioxide, and saturated oxygen.

36. (Currently Amended) A method of utilizing an implantable medical device to provide therapy for sleep-disordered breathing, comprising:

determining if sleep-disordered breathing is present; ~~and~~

delivering augmentation therapy in the form of electrical stimulation to cardiac tissue if sleep-disordered breathing is determined to be present;

determining a cycle length for a sleep-disordered breathing episode; and

delivering the augmentation therapy for X number of cardiac cycles, wherein X is selected based on the determined cycle length, wherein the cycle length is an averaged value of multiple sleep-disordered breathing episodes.

37. (Original) The method of claim 36, wherein delivering augmentation therapy includes delivering PESP.

38. (Original) The method of claim 37, further comprising delivering ACP contemporaneously with the delivery of the augmentation therapy.

39. (Original) The method of claim 38, wherein the ACP includes an AOP offset.

40. (Original) The method of claim 36, wherein delivering augmentation therapy includes delivering NES/CCM.

41. (Original) The method of claim 40, further comprising delivering AOP contemporaneously with the augmentation therapy.

42. (Original) The method of claim 36, wherein delivering augmentation therapy includes delivering NES/CCM and PESP.

43. (Original) The method of claim 42, further comprising delivering ACP contemporaneously with the augmentation therapy.

44. (Original) The method of claim 43, wherein the ACP includes an AOP offset.

45. (Current Amended) The method of claim 36, further comprising:

determining if an onset of sleep-disordered breathing is ~~occuring~~occurring; and

delivering the augmentation therapy prior to the sleep-disordered breathing ~~occuring~~occurring.

46. (Original) The method of claim 36, further comprising:

determining a mean heart rate oscillation; and

generating atrial overdrive pacing contemporaneously with the augmentation therapy, wherein an atrial overdrive pacing rate is the determined mean heart rate plus an integer value.

47. (Original) The method of claim 36, further comprising:

determining a cycle length of sleep-disordered breathing;

determining mean heart rate oscillation; and

delivering ACP contemporaneously with the augmentation therapy for X cardiac cycles, wherein X is selected based on the determined cycle length and the ACP rate is equal to twice the mean heart rate oscillation plus an integer value causing an AOP offset.

48. (Original) The method of claim 36, wherein the X number of cardiac cycles equates to a time interval that is equal to or greater than the cycle length.

49. (Cancelled)

50. (Original) The method of claim 36, wherein the x number of cardiac cycles equate to a time interval that is equal to or greater than the cycle length.

51. (Cancelled)

52. (Currently Amended) The method of claim ~~49~~36, further comprising:

detecting an onset of a sleep-disordered breathing episode; and

causing the augmentation therapy to be delivered prior to the episode occuring.

53. (Original) The method of claim 36, further comprising:

monitoring a first time value as a heart rate increase beyond a dynamic threshold;

monitoring a second time value of a subsequent occurrence of the heart rate increasing beyond the dynamic threshold;

calculating a final cycle time by subtracting the first time value from the second time value; and

delivering the augmentation therapy for X number of cardiac cycles, wherein X is selected based on the calculated final cycle time.

54. (Original) The method of claim 53, wherein X cardiac cycles equate to a time interval that is greater than or equal to the final cycle time.

55. (Original) The method of claim 53, wherein multiple episodes of sleep-disordered breathing are monitored, each episode resulting in an individual cycle time so that the final cycle time is an average of the individual cycle times.

56. (Original) The method of claim 55, wherein the individual cycle times are discarded if they are shorter than a predetermined minimum value or are longer than a predetermined maximum value.

57. (Original) The method of claim 56, wherein the final cycle time is calculated only if the individual cycle times result from consecutive episodes.

58. (Original) The method of claim 53, further comprising:

determining a mean sleep disorder heart rate that is the mean value of the heart rate during sleep-disordered breathing; and

generating atrial pacing contemporaneously with the augmentation therapy, wherein an atrial pacing rate is selected based on the mean sleep disorder heart rate.

59. (Original) The method of claim 58, wherein the atrial pacing rate is equal to the mean sleep disorder heart rate plus an integer value to achieve AOP.

60. (Original) The method of claim 58, wherein the atrial pacing rate is equal to a multiple of the sleep disorder heart rate to achieve ACP.

61. (Original) The method of claim 58, wherein the atrial pacing rate is equal to a multiple of the sleep disorder heart rate plus an integer value to achieve ACP with and AOP offset.

62. (Original) The method of claim 36, further comprising:

delivering AOP along as a therapy for sleep-disordered breathing and only proceeding to deliver the augmentation therapy if AOP is unsuccessful.

63. (Original) The method of claim 36, wherein determining if sleep-disordered breathing is present includes obtaining data from a sensor monitoring a physical parameter.

64. (Original) The method of claim 63, wherein the physical parameter is one selected from the group consisting of: respiration rate, minute ventilation, heart rate, neural activity, apnea, hypopnea, hyperventilation, breath sounds, temperature, blood pressure, chest movement, impedance, saturated carbon dioxide, and saturated oxygen.

65. (Currently Amended) A computer readable medium containing instructions that when implemented, cause an implantable medical device to perform actions to provide therapy for sleep-disordered breathing, the actions comprising:

determining if sleep-disordered breathing is present; and

delivering augmentation therapy in the form of electrical stimulation to cardiac tissue if sleep-disordered breathing is determined to be present,

determining a cycle length for a sleep-disordered breathing episode; and

delivering the augmentation therapy for X number of cardiac cycles, wherein X is selected based on the determined cycle length, wherein the cycle length is an averaged value of multiple sleep-disordered breathing episodes.

66. (Original) The computer readable medium of claim 65, wherein delivering augmentation therapy includes delivering PESP.

67. (Original) The computer readable medium of claim 66, further comprising delivering ACP contemporaneously with the delivery of the augmentation therapy.

68. (Original) The computer readable medium of claim 67, wherein the ACP includes an AOP offset.

69. (Original) The computer readable medium of claim 65, wherein delivering augmentation therapy includes delivering NES/CCM.

70. (Original) The computer readable medium of claim 69, further comprising delivering AOP contemporaneously with the augmentation therapy.

71. (Original) The computer readable medium of claim 65, wherein delivering augmentation therapy includes delivering NES/CCM and PESP.

72. (Original) The computer readable medium of claim 71, further comprising delivering ACP contemporaneously with the augmentation therapy.

73. (Original) The computer readable medium of claim 72, wherein the ACP includes an AOP offset.

74. (Original) The computer readable medium of claim 65, further comprising:
determining if an onset of sleep-disordered breathing is occuring; and
delivering the augmentation therapy prior to the sleep-disordered breathing occuring.

75. (Original) The computer readable medium of claim 65, further comprising:
determining a mean heart rate oscillation; and

generating atrial overdrive pacing contemporaneously with the augmentation therapy, wherein an atrial overdrive pacing rate is the determined mean heart rate plus an integer value.

76. (Currently Amended) The computer readable medium of claim ~~36~~ 65 further comprising:

determining a cycle length of sleep-disordered breathing;

determining mean heart rate oscillation; and

delivering ACP contemporaneously with the augmentation therapy for X cardiac cycles, wherein X is selected based on the determined cycle length and the ACP rate is equal to twice the mean heart rate oscillation plus an integer value causing an AOP offset.

77. (Original) The computer readable medium of claim 65, wherein the X number of cardiac cycles equates to a time interval that is equal to or greater than the cycle length.

78. (Cancelled).

79. (Original) The computer readable medium of claim 65, wherein the x number of cardiac cycles equate to a time interval that is equal to or greater than the cycle length.

80. (Cancelled).

81. (Currently Amended) The computer readable medium of claim ~~78~~ 65, further comprising:

detecting an onset of a sleep-disordered breathing episode; and

causing the augmentation therapy to be delivered prior to the episode occuring.

82. (Original) The computer readable medium of claim 65, further comprising:

monitoring a first time value as a heart rate increase beyond a dynamic threshold;

monitoring a second time value of a subsequent occurrence of the heart rate increasing beyond the dynamic threshold;

calculating a final cycle time by subtracting the first time value from the second time value; and

delivering the augmentation therapy for X number of cardiac cycles, wherein X is selected based on the calculated final cycle time.

83. (Original) The computer readable medium of claim 82, wherein X cardiac cycles equate to a time interval that is greater than or equal to the final cycle time.

84. (Original) The computer readable medium of claim 82, wherein multiple episodes of sleep-disordered breathing are monitored, each episode resulting in an individual cycle time so that the final cycle time is an average of the individual cycle times.

85. (Original) The computer readable medium of claim 84, wherein the individual cycle times are discarded if they are shorter than a predetermined minimum value or are longer than a predetermined maximum value.

86. (Original) The computer readable medium of claim 85, wherein the final cycle time is calculated only if the individual cycle times result from consecutive episodes.

87. (Original) The computer readable medium of claim 82, further comprising:

determining a mean sleep disorder heart rate that is the mean value of the heart rate during sleep-disordered breathing; and

generating atrial pacing contemporaneously with the augmentation therapy, wherein an atrial pacing rate is selected based on the mean sleep disorder heart rate.

88. (Original) The computer readable medium of claim 87, wherein the atrial pacing rate is equal to the mean sleep disorder heart rate plus an integer value to achieve AOP.

89. (Original) The computer readable medium of claim 87, wherein the atrial pacing rate is equal to a multiple of the sleep disorder heart rate to achieve ACP.

90. (Original) The computer readable medium of claim 87, wherein the atrial pacing rate is equal to a multiple of the sleep disorder heart rate plus an integer value to achieve ACP with and AOP offset.

91. (Original) The computer readable medium of claim 65, further comprising:

delivering AOP along as a therapy for sleep-disordered breathing and only proceeding to deliver the augmentation therapy if AOP is unsuccessful.

92. (Original) The computer readable medium of claim 65, wherein determining if sleep-disordered breathing is present includes obtaining data from a sensor monitoring a physical parameter.

93. (Original) The computer readable medium of claim 92, wherein the physical parameter is one selected from the group consisting of: respiration rate, minute ventilation, heart rate, neural activity, apnea, hypopnea, hyperventilation, breath sounds, temperature, blood pressure, chest movement, impedance, saturated carbon dioxide, and saturated oxygen.